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**(54) STEM FREE TESTING
DEVICE OF MAIN STEAM
STOP VALVE**

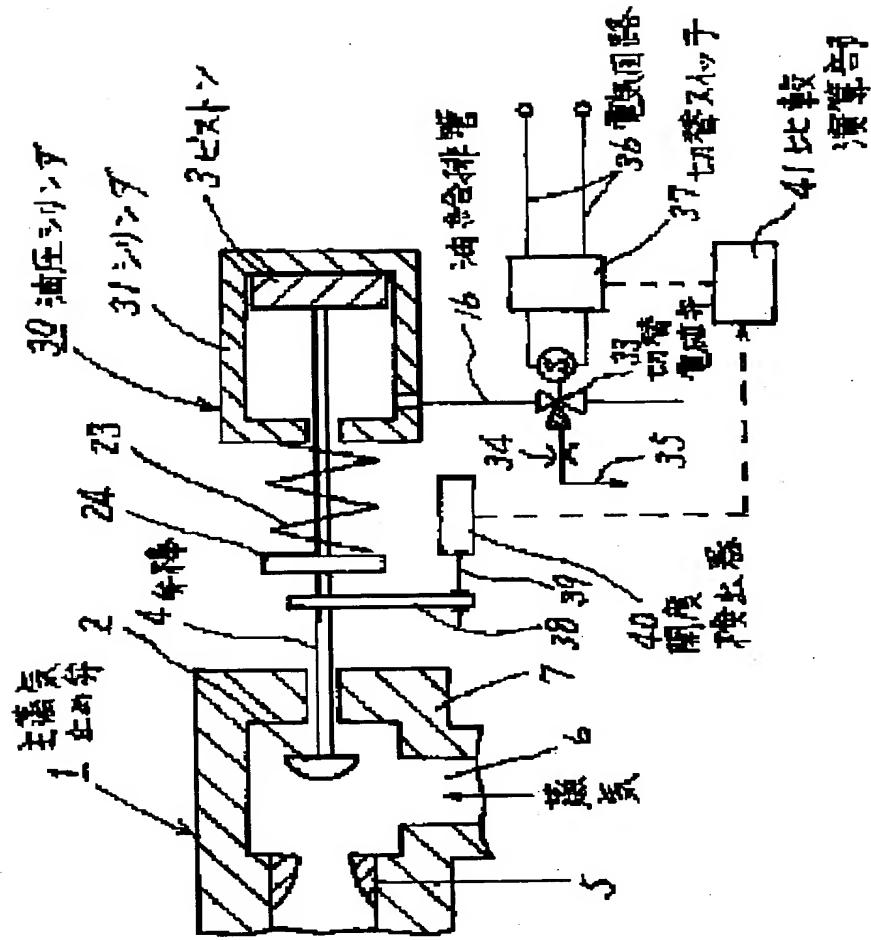
(57) Abstract:

PURPOSE: To provide a simply constructed stem free test device of a main steam stop valve, with which if the closing operation of a valve steam is assuredly executed or not if the main steam stop valve is required to be urgently closed when steam to a steam turbine is urgently shut off

during turbine operation.

CONSTITUTION: A switching solenoid valve 33 arranged in an oil intake/exhaust pipe 16 connected to an oil pressure cylinder 30, is energized by a change-over switch 37, pressure oil in a cylinder 31 is discharged from an oil exhaust pipe 35 so as to move a valve stem 4 in the closing direction, and a detection opening in an opening detector 40 is comparatively operated with a predetermined test opening in a comparative operation part 41. When the detection opening is below the test opening, the switching solenoid valve 33 is deenergized by the change-over switch 37, the pressure oil is led to flow into the cylinder 31 so that the valve stem 4 is returned in a fully opening position, thus the reciprocating motion of this valve stem 4 is monitored.

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[Claim(s)]

[Claim 1] The valve rod linked to the piston of an oil hydraulic cylinder In the stem free test equipment of the main stop valve which checks a motion of said valve rod of the main stop valve which is made to reciprocate by the feeding and discarding to the cylinder of the pressure oil which passes through oil feeding-and-discarding tubing linked to a cylinder, and performs inflow of the steam to a steam turbine and cutoff during turbine operation, it is prepared in said oil feeding-and-discarding tubing. Formation of the passage which makes the pressure oil supplied to an oil hydraulic cylinder flow in a cylinder by the change to excitation and deenergisation, The change solenoid valve with which formation of the passage which prevents formation of this passage and discharges the pressure oil in a cylinder outside is changed, The electrical circuit connected to this change solenoid valve in order to carry out deenergisation, excitation and OFF and the circuit changing switch which carries out close, It compares with the predetermined trial opening which was able to define beforehand the detection opening in the opening detector which detects the opening of a main stop valve by the stroke of a valve rod, and this opening detector. At the time of below this opening Stem free test equipment of the main stop valve characterized by having the comparison-operation section which outputs the signal which changes a circuit changing switch.

[Claim 2] The valve rod linked to the piston of an oil hydraulic cylinder In the stem free test equipment of the main stop valve which checks a motion of said valve rod of the main stop valve which is made to reciprocate by the feeding and discarding to the cylinder of the pressure oil which passes through oil feeding-and-discarding tubing linked to a cylinder, and performs inflow of the steam to a steam turbine and cutoff during turbine operation, it is prepared in said oil feeding-and-discarding tubing. Formation of the passage which makes the pressure oil supplied to an oil hydraulic cylinder flow in a cylinder by the change to excitation and deenergisation, The change solenoid valve with which formation of the passage which prevents formation of this passage and discharges the pressure oil in a cylinder outside is changed, The electrical circuit connected to this change solenoid valve in order to carry out deenergisation, excitation and OFF and the circuit changing switch which carries out close, The opening detector which detects the opening of a main stop valve by the stroke of a valve rod, and the trial opening setter which sets the trial opening in comparison with the detection opening in this opening detector as the opening of the arbitration from a close by-pass bulb completely to full open, Stem free test equipment of the main stop valve characterized by having the comparison-operation section which outputs the signal which changes a circuit changing switch for the detection opening in an opening detector as compared with the setting trial opening from a trial opening setter at the time of below this opening.

[Claim 3] Stem free test equipment of the main stop valve characterized by preparing a diaphragm in the passage which discharges the pressure oil in the cylinder of an oil hydraulic cylinder from a change solenoid valve in a thing according to claim 1 or 2.

[Detailed Description of the Invention]

[0001]

[Industrial Application] It is related with the stem free test equipment of the main stop valve which checks during turbine operation that the main stop valve which intercepts the steam with which this invention is supplied to a steam turbine can ensure steamy cutoff at the time of an emergency.

[0002]

[Description of the Prior Art] A main stop valve needs to perform inflow of the steam to a steam turbine, and cutoff, and needs to carry out emergency cutoff of the steam certainly to a

turbine at the time of emergencies, such as accident. However, a main stop valve has a possibility that actuation of the valve rod (it is also called a stem) may be checked during turbine operation by fixing by increase of a scale, or bite lump of a foreign matter, and emergency cutoff may become impossible. For this reason, in order to check that the emergency cutoff of the main stop valve can be carried out, the valve rod of a turbine operation Chuzu steamy stop valve was operated, and the stem free test equipment which checks that closing of the main stop valve at the time of emergency cutoff is ensured is formed in the main stop valve.

[0003] Drawing 7 is equipped with this kind of stem free test equipment, is the block diagram of the main stop valve opened and closed by the oil hydraulic cylinder, and explains the conventional technique using drawing. In drawing 7, a valve element 2 and this valve element 2 are attached, the valve rod 4 by which the piston 3 was connected to a different edge from a valve element 2, and a valve rod 4 penetrate, and the main stop valve 1 consists of valve casing 7 in which the valve seat 5 and the steamy inlet port 6 where a valve element 2 sits down were established.

[0004] The valve rod 4 which connected the piston 3 penetrates, and the oil hydraulic cylinder 9 consists of cylinders 13 equipped with the side attachment wall which consists of barrel 13b surrounding a piston 3, the piston 12 for a test which has the test piston 10 which has a larger path than the path of this piston 3, and barrel 13a and the test piston 10 surrounding a piston 3. Here, the piston 12 for a test was attached in the test piston 10, and is equipped with the rod 15 in contact with the rear face of a piston 3. In addition, the oil feeding-and-discarding tubing 16 which carries out the feeding and discarding of the pressure oil into barrel 13a of a cylinder 13 is connected to the side attachment wall of barrel 13a of a cylinder 13, and the bottom plate 17 of a cylinder 13 is equipped with a cross valve 18, and the oil feeding-and-discarding tubing 20 which carries out the feeding and discarding of the pressure oil between the test piston 10 and a bottom plate 17 is connected to it. In addition, the oil supply pipe 21 and the oil exhaust pipe 22 are connected to the cross valve 18.

[0005] A close spring 23 moves a valve rod in the closed direction according to the spring force, when it is prepared between the spring seat 24 prepared in the valve rod 4, and the superior lamella 25 of a cylinder 13 and a main stop valve 1 is made close. During turbine operation, by the pressure oil between the piston 3 in a cylinder 13 and a bottom plate 17 being discharged by the change of a cross valve 18 through the oil exhaust pipe 22 from the oil feeding-and-discarding tubing 20, and supplying a pressure oil in a cylinder 13 from the oil feeding-and-discarding tubing 16, the piston 3 which connected the valve rod 4 resists the force of a close spring 23, it moves to the method of the right, and the main stop valve 1 is opened fully by such configuration.

[0006] When checking a motion of the valve rod 4 of a main stop valve 1 in such the condition, by changing a cross valve 18 and supplying a pressure oil through the oil feeding-and-discarding tubing 20 in the cylinder 13 on the backside [the test piston 10 of the piston 12 for a test] from the oil supply pipe 21, the piston 12 for a test is moved and a piston 3 is moved in the closed direction of a valve rod 4 through a rod 15. The stroke of the valve rod 4 at this time is the stroke s until the test piston 10 contacts the step of a connection with the barrels 13a and 13b of a cylinder 13.

[0007] In addition, when changing a main stop valve 1 into a full open condition after moving a valve rod 4 in the closed direction, by changing a cross valve 18 and discharging the pressure oil between the test piston 10 and a bottom plate 17 from the oil exhaust pipe 22 through the oil feeding-and-discarding tubing 20, a piston 3 is the original location and return and a main stop valve are opened fully. By supervising reciprocation by the stroke s with the piston 12 for a test of such a valve rod 4, it is checked that closing at the time of the emergency of a main stop valve is ensured.

[0008] Although carried out with the above-mentioned conventional technique by supervising

reciprocation by the stroke s which is a partial stroke of a valve rod 4 about the check of closing at the time of the emergency of a main stop valve 1 Even if two or more installation is carried out and a main stop valve carries out the close by-pass bulb completely of one in two or more main stop valves, when there is no trouble in operation of a turbine, the reciprocation of all strokes from full open of a valve rod to [make carry out sequential closing motion of two or more main stop valves, and] a close by-pass bulb completely is supervised. It is checking that closing at the time of the emergency of all main stop valves is ensured.

[0009]

[Problem(s) to be Solved by the Invention] Since it is necessary to form stem free test equipment equipped with the piston 12 for a test which makes the valve rod 4 of a main stop valve reciprocate in the oil hydraulic cylinder of a main stop valve in order to check whether the main stop valve of a full open condition can be closed down during turbine operation at the time of an emergency, while structure becomes complicated, there is a problem that cost goes up.

[0010] Moreover, by opening [when two or more main stop valves are installed in the steam turbine] and closing one main stop valve one by one as mentioned above, although it has the piston 12 for a test and drops off Since it can check that closing at the time of the emergency of all main stop valves is ensured There is a problem of becoming disadvantageous when the structures of an oil hydraulic cylinder differ and a standardization and systematization of an oil hydraulic cylinder are attained, by the case of the piston for a test of being unnecessary, and the case of the need, with the number of installation of main stop valves.

[0011] The purpose of this invention is offering the stem free test equipment of the main stop valve which can check closing at the time of the emergency of a main stop valve being ensured by the monitor of reciprocation by all strokes that result in the partial stroke which results in the partial gate opening of the valve rod of a main stop valve, or a close by-pass bulb completely while making it into easy structure, without having a piston for a test.

[0012]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the valve rod which is connected to the piston of an oil hydraulic cylinder according to this invention In the stem free test equipment of the main stop valve which checks a motion of said valve rod of the main stop valve which is made to reciprocate by the feeding and discarding to the cylinder of the pressure oil which passes through oil feeding-and-discarding tubing linked to a cylinder, and performs inflow of the steam to a steam turbine and cutoff during turbine operation, it is prepared in said oil feeding-and-discarding tubing. Formation of the passage which makes the pressure oil supplied to an oil hydraulic cylinder by the change to excitation and deenergisation flow in a cylinder, The change solenoid valve which changes formation of the passage which prevents formation of this passage and discharges the pressure oil in a cylinder, The electrical circuit connected to this change solenoid valve in order to carry out deenergisation, excitation and OFF and the circuit changing switch which carries out close, As compared with the predetermined trial opening which was able to define beforehand the detection opening in the opening detector which detects the opening of a main stop valve by the stroke of a valve rod, and this opening detector, it shall have the comparison-operation section which outputs the signal which changes a circuit changing switch at the time of below this opening.

[0013] In the stem free test equipment of the above-mentioned main stop valve, moreover, instead of the comparison-operation section in comparison with the trial opening which was able to define the detection opening in an opening detector beforehand The detection opening in the trial opening setter which sets the trial opening which measures said detection opening as the opening of the arbitration from a close by-pass bulb completely to full open, and an opening detector is measured with the setting trial opening from a trial opening setter. At the time of below this opening The comparison-operation section which outputs the signal which

changes a circuit changing switch shall be prepared.

[0014] Moreover, in the stem free test equipment of the above-mentioned main stop valve, a diaphragm shall be prepared in the passage which discharges the pressure oil in the cylinder of an oil hydraulic cylinder from a change solenoid valve.

[0015]

[Function] the electrical circuit which connects to this solenoid valve the change solenoid valve which prepared the pressure oil in oil feeding-and-discarding tubing which carries out feeding and discarding to a cylinder in order to make the piston of the oil hydraulic cylinder to which the valve rod of a main stop valve was connected reciprocate within a cylinder and to open and close a main stop valve -- a circuit changing switch -- OFF -- close is carried out and it is made excitation and deenergisation. Under the present circumstances, a change solenoid valve is changed to forming the passage where the pressure oil supplied to an oil hydraulic cylinder by excitation or deenergisation flows in a cylinder, and forming the passage which formation of this passage is prevented and discharges the pressure oil in a cylinder outside.

[0016] Therefore, if the passage which flows into a cylinder the pressure oil supplied to an oil hydraulic cylinder is formed when a change solenoid valve is made into deenergisation by actuation of a circuit changing switch, the feeding and discarding to a cylinder of the pressure oil supplied to an oil hydraulic cylinder by this passage will become possible, the piston which connected the valve rod by the feeding and discarding of this pressure oil will reciprocate, and a main stop valve will be opened and closed. Therefore, by flowing a pressure oil in a cylinder, a piston moves the valve rod linked to a piston in the open direction, and a main stop valve is opened fully.

[0017] If a circuit changing switch is changed and a change solenoid valve is excited in the state of full open of this main stop valve, since the passage which formation of said passage is prevented and discharges the pressure oil in a cylinder will be formed, the pressure oil in a cylinder flows this passage, and is discharged outside, and a piston moves the valve rod linked to a piston in the closed direction. At this time, the stroke of a valve rod, i.e., the opening of a main stop valve, is detected by the opening detector, and the signal of this detection opening is inputted into the comparison-operation section. In this comparison-operation section, a comparison operation is carried out to the trial opening whose inputted detection opening is the partial stroke of the valve rod defined beforehand, and when detection opening is below trial opening, a signal is outputted. By inputting into a circuit changing switch, this signal changes a circuit changing switch and changes a change solenoid valve into a deenergisation condition from an excitation condition. Since the pressure oil which the passage of a change solenoid valve is changed by this deenergisation, and is supplied to an oil hydraulic cylinder flows in a cylinder, the valve rod which became close to predetermined trial opening moves in the open direction again, and a main stop valve is opened fully.

[0018] Therefore, since a valve rod is opened and closed from full open to predetermined trial opening, it is checked by supervising a motion of the valve rod accompanying this closing motion that closing at the time of the emergency of a main stop valve is ensured. Moreover, it considers as the trial opening which set up the above-mentioned predetermined trial opening defined beforehand by the trial opening setter set as the opening of the arbitration from a close by-pass bulb completely to full open. Carry out the comparison operation of this setting trial opening and the detection opening in said opening detector in the comparison-operation section, and when detection opening is below setting trial opening, a circuit changing switch is changed. It checks that check the motion by closing motion from full open of a valve rod to setting trial opening as mentioned above, and closed actuation of the valve rod at the time of emergency closing of a main stop valve is ensured.

[0019] Moreover, since the rate which the pressure oil in the cylinder when moving the valve rod of a main stop valve in the closed direction by preparing a diaphragm in the passage which discharges the pressure oil in the cylinder of an oil hydraulic cylinder from a change

solenoid valve discharges is made loose, it can prevent being closed according to the operation delay in the comparison-operation section in opening with a main stop valve smaller than the predetermined trial opening defined beforehand or setting trial opening.

[0020]

[Example] Based on a drawing, the example of this invention is explained below. Drawing 1 is the schematic diagram of the main stop valve which is equipped with the stem free test equipment by the example of this invention, and is opened and closed by the oil hydraulic cylinder. In addition, in drawing 1 and drawing 2 mentioned later thru/or drawing 6, the same sign is given to the same components as the conventional example of drawing 7, and the explanation is omitted. In drawing 1, it differs from the conventional example of drawing 7 as follows.

[0021] The cylinder 31 of an oil hydraulic cylinder 30 surrounds the piston 3 to which the valve rod 4 was connected, and is formed. The change solenoid valve 33 is formed in the oil feeding-and-discarding tubing 16 linked to a cylinder 31. The change solenoid valve 33 prevents formation of the passage where it is made for the pressure oil supplied to an oil hydraulic cylinder 30 by deenergisation to flow into a cylinder 31 through the oil feeding-and-discarding tubing 16, and an inflow in the cylinder 31 of the pressure oil supplied to an oil hydraulic cylinder 30 by excitation, and is changed to formation of the passage discharged outside through the oil exhaust pipe 35 which extracted the pressure oil in a cylinder 31 and was equipped with 34.

[0022] The electrical circuit 36 energized to this solenoid valve is connected to the change solenoid valve 33, and a circuit changing switch 37 makes the change solenoid valve 33 deenergisation and excitation according to that OFF and close. A lever 38 is attached in a valve rod 4, this lever 38 is attached in the sensor rod 39 of the opening detector 40, and the opening detector 40 detects the stroke of a valve rod 4, i.e., opening, through a lever 38.

[0023] The comparison-operation section 41 makes trial opening the partial stroke as which it was beforehand determined of all the strokes from full open of a valve rod 4 to a close by-pass bulb completely, i.e., a partial gate opening, carries out the comparison operation of the detection opening in the opening detector 40 to said trial opening, and when detection opening is below trial opening, it outputs the signal which changes a circuit changing switch 37. If a main stop valve 1 makes an electrical circuit 36 open by the change of a circuit changing switch 37 and the change solenoid valve 33 is made into deenergisation by such configuration, the inflow of the pressure oil to the oil exhaust pipe 35 will be prevented, and a pressure oil will flow in the cylinder 31 of an oil hydraulic cylinder 30 from the oil feeding-and-discarding tubing 16 through the change solenoid valve 33. The piston 3 which connected the valve rod 4 by this pressure oil that flowed resists the spring force of a close spring 23, and moves in the open direction of the method of the right, and a main stop valve 1 is opened fully. A steam is supplied to a steam turbine through a main stop valve 1 in the state of this full open.

[0024] The trial which checks that closed actuation of a valve rod 4 is ensured is performed as follows in the state of full open of such a main stop valve 1 at the time of emergency closing of a main stop valve 1. A circuit changing switch 37 is changed, an electrical circuit 36 is made close, and the change solenoid valve 33 is made excitation from deenergisation. It is prevented by the flow direction of the change solenoid valve 33 which shows the pressure oil supplied to the cylinder 31 of an oil hydraulic cylinder 30 to drawing 2 by excitation of this change solenoid valve 33, and the pressure oil in a cylinder 31 is extracted from the oil exhaust pipe 35, and an elimination rate becomes loose by 34 and it is discharged. The piston 3 which connected the valve rod 4 by discharge of this pressure oil moves in the left closed direction at a loose rate according to the force of a close spring 23. Under the present circumstances, the stroke of a valve rod 4, i.e., opening, is detected by the opening detector 40, and the signal of this detection opening is inputted into the comparison-operation section

41.

[0025] The comparison operation of the detection opening inputted in the comparison-operation section 41 is carried out to the trial opening which is the partial stroke of the predetermined valve rod defined beforehand, and when detection opening is below trial opening, it outputs a signal, changes a circuit changing switch 37 with this signal, and makes an electrical circuit 36 open. Therefore, the change solenoid valve 33 is made deenergisation by open [of this electrical circuit 36], the piston 3 which connected the valve rod 4 moves in the open direction of the method of the right, and a main stop valve 1 is opened fully.

[0026] In addition, the loose discharge of the pressure oil of a rate which prepared in the oil exhaust pipe 35 extract and according to 34 makes the closing rate of a valve rod loose, and he is trying not to close it in opening smaller than trial opening according to the operation delay in the comparison-operation section 41. By supervising reciprocation to the full open blank test opening of a valve rod 4 as mentioned above, it can check that closed actuation of a valve rod 4 is ensured at the time of emergency closing of a main stop valve 1.

[0027] In addition, although the pressure oil in a cylinder 31 is discharged in this example at the time of excitation of the change solenoid valve 33, the pressure oil in a cylinder 31 is discharged at the time of un-exciting, and you may make it supply a pressure oil in a cylinder 31 at the time of excitation. Drawing 3 is the flow Fig. showing the flow of the trial which checks a motion of the valve rod 4 of the above-mentioned main stop valve 1, and it explains the flowing further, referring to drawing 1 based on drawing 3 .

[0028] drawing 3 , if it is and a circuit changing switch 37 is eagerly carried out at step 50 during turbine operation The change solenoid valve 33 is un-exciting at step 51 more eagerly, and the passage of this pressure oil that flows the change solenoid valve 33 Becoming the passage (the change solenoid-valve open of step 51 showing at drawing 3) where the pressure oil supplied to an oil hydraulic cylinder 30 flows into a cylinder 31 through the oil feeding-and-discarding tubing 16, the piston 3 which the pressure oil flowed in the cylinder 31 and connected to the valve rod 4 is moved in the open direction, and a main stop valve 1 is opened fully. At this time, the signal of the detection opening in the opening detector 40 is not inputted into the comparison-operation section 41.

[0029] When checking that closed actuation of a valve rod 4 is ensured in the state of full open of the above-mentioned main stop valve 1 at the time of emergency closing of a main stop valve 1, a circuit changing switch 37 is made close at step 50. By close [this], the signal of the detection opening in the opening detector 40 is inputted into the comparison-operation section 41. And the signal of said detection opening is inputted into an adder 45 in the comparison-operation section 41, in order to supervise a motion of a valve rod 4, a comparison operation is carried out to the predetermined trial opening 53 defined beforehand, and the opening deflection 54 calculates. And by step 54, while opening deflection is larger than 0%, the change solenoid valve 33 is excited at step 55. An inflow in the cylinder 31 of the pressure oil which supplies the passage of the change solenoid valve 33 to an oil hydraulic cylinder 30 is prevented. Since the pressure oil in a cylinder 31 serves as passage (the change solenoid-valve close of step 55 shows at drawing 3) discharged from the oil exhaust pipe 35 and the pressure oil in a cylinder 31 is discharged from the oil exhaust pipe 35, the piston 3 linked to a valve rod 4 moves in the closed direction. When the stroke of the valve rod 4 at this time, i.e., opening, is detected by the opening detector 40, the comparison operation of this detection opening is carried out to the trial opening 53 in the comparison-operation section 41 and the opening deflection 54 is 0% or less, A signal is outputted, the circuit changing switch 37 in step 50 is eagerly changed by this signal, the change solenoid valve 33 is made into deenergisation at step 51 as mentioned above, the change solenoid valve 33 is made open, and a main stop valve 1 is made full open at step 52. In addition, the signal of the detection opening in the opening detector 40 is not inputted into the comparison-operation section 41 at this time.

[0030] Therefore, by the monitor of reciprocation of the valve rod to the full open blank test opening of the above-mentioned valve rod 4, it can check that closed actuation of a valve rod 4 is ensured at the time of emergency closing of a main stop valve 1. Drawing 4 is the schematic diagram of the main stop valve which is equipped with the stem free test equipment by the example from which this invention differs, and is opened and closed by the oil hydraulic cylinder. In drawing 4, the comparison-operation section 49 which carries out the comparison operation of the detection opening in the trial opening setter 48 which sets up the opening of the arbitration of a before [from full open of a main stop valve / a close by-pass bulb completely] as trial opening instead of and the opening detector 40 to the setting trial opening from the trial opening setter 48 was formed, and also it is the same as drawing 1 . [the trial opening as which drawing 1 was determined beforehand]

[0031] When checking that closed actuation of the valve rod 4 at the time of emergency closing of a main stop valve 1 is ensured by such configuration, reciprocation of the valve rod to the opening of arbitration until it results [from a close by-pass bulb completely] in full open can be supervised as mentioned above by setting up trial opening by the trial opening setter 48. Drawing 6 is the flow Fig. showing the flow of the trial which checks the motion of the valve rod 4 of a main stop valve 1 based on the schematic diagram of drawing 4 . The trial opening used as the criteria compared in the comparison-operation section 49 in drawing 6 by the trial opening setter 48 By setting up the opening of the arbitration of a before [from the close by-pass bulb completely of the valve rod 4 of a main stop valve 1 / full open] as trial opening, performing reciprocation of the valve rod 4 until it results [from full open] in this setting trial opening 57 like drawing 3 , and supervising a motion of this valve rod 4 It can check that closed actuation of the valve rod 4 at the time of emergency closing of a main stop valve 1 is ensured.

[0032] In addition, in the steam turbine which equips the steam turbine 58 as shown in one main stop valve or drawing 5 with two or more main stop valves 1, it is effective in the stem free test of a main stop valve by forming this trial opening setter 48. That is, in the steam turbine which has one main stop valve, the opening to which the amount of steams which does not have trouble in operation of a turbine flows by the trial opening setter 48 can be set as trial opening. Moreover, since a main stop valve 1 can be made into one-piece ***** and the stem free test of a main stop valve 1 can be performed in the steam turbine 58 equipped with plurality 1, for example, two main stop valves, as shown in drawing 5 , it can carry out by setting trial opening as close-by-pass-bulb-completely opening by the trial opening setter 48.

[0033]

[Effect of the Invention] According to this invention, so that clearly from the above explanation by the above-mentioned configuration The main stop valve of a full open condition during operation of a steam turbine by the detection opening in an opening detector By supervising reciprocation of the valve rod of a main stop valve until it results in the trial opening set as the predetermined trial opening defined beforehand or the opening of arbitration until it results [from a close by-pass bulb completely] in full open It can check that closed actuation of a valve rod is ensured at the time of emergency closing of the main stop valve at the time of emergency cutoff of the steam to a steam turbine. In addition, since a motion of the valve rod of a main stop valve can be checked during turbine operation, without preparing the piston for a test to which the piston of an oil hydraulic cylinder is moved like before, while structure becomes easy and cost decreases, a standardization and systematization of an oil hydraulic cylinder are obtained easily.

[0034] Moreover, it can prevent being closed in opening smaller than the trial opening beforehand defined according to the operation delay in the comparison-operation section, or setting trial opening by preparing a diaphragm in the passage which discharges the pressure oil in the cylinder of an oil hydraulic cylinder from a change solenoid valve.